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# Gas Journal

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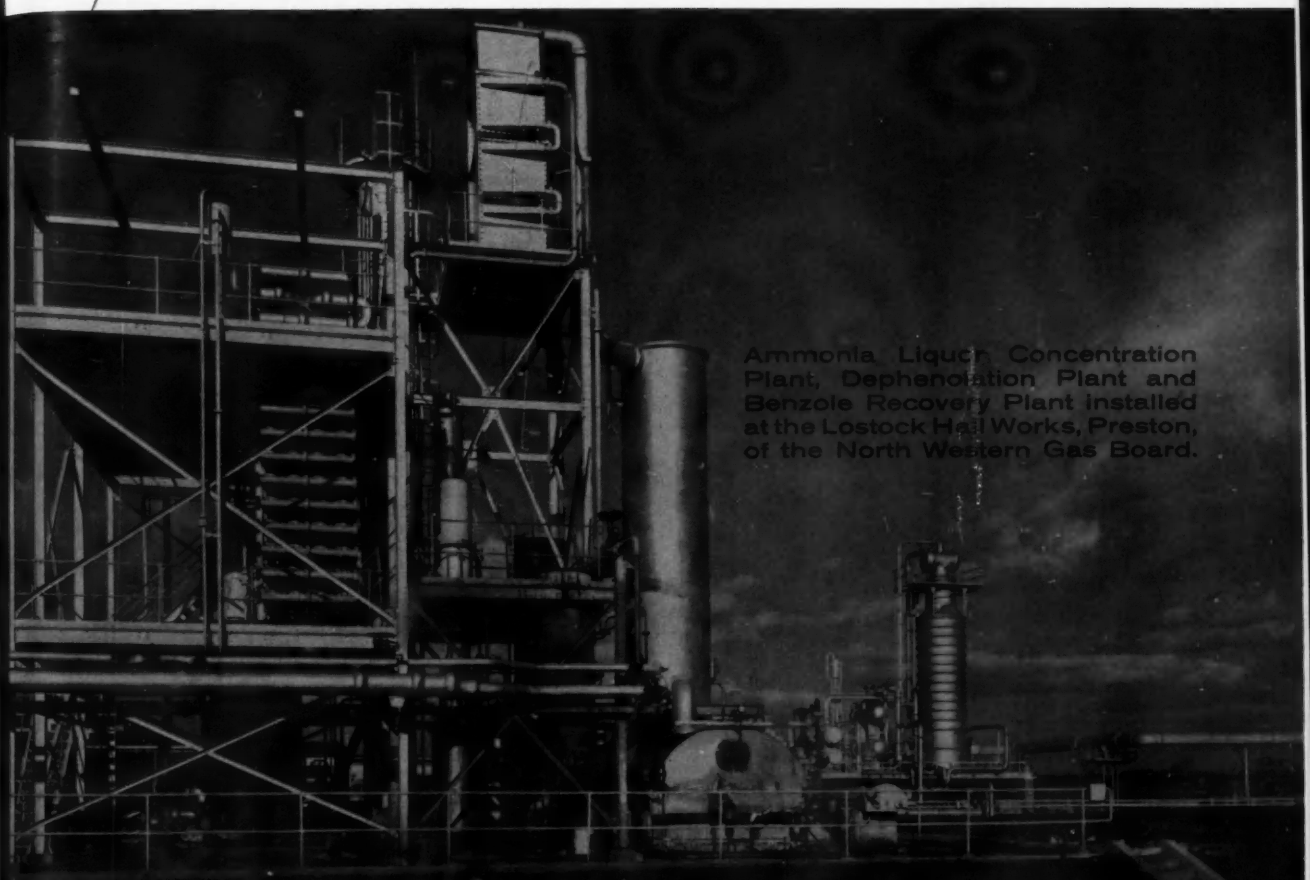
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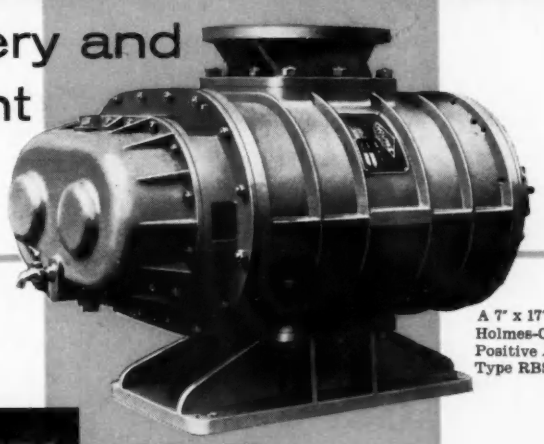

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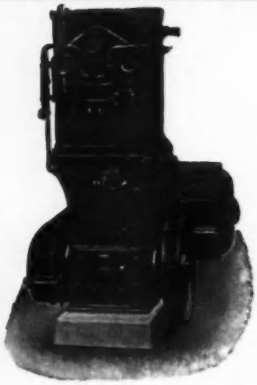

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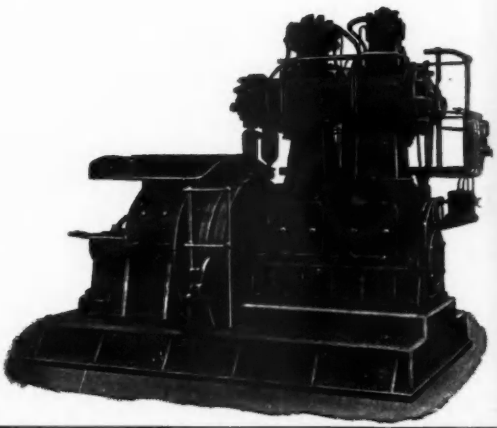

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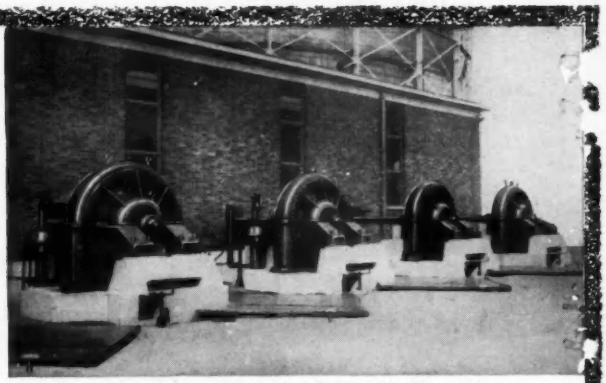

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# Gas Journal

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WEDNESDAY, MARCH 16, 1960

## CONTENTS

### *EDITORIAL COMMENT*

Parliament Reviews the Industry - - - - - 429
Oil Heaters - - - - - - - - - 431
New List of G Numbers - - - - - - - 431
Symposium on Corrosion - - - - - - 431

### *NEWS SUPPLEMENT*

Commons Speech Rejects Idea of Curtailing Development - - - - - - - - - - 443
Anti-smoke Progress Quiz Goes Out to 1,700 Local Authorities - - - - - - - - 443
France Completes Final Link in Lacq-Paris Feeder System - - - - - - - - - 446
Ruhr City Has New Gasholder - - - - 446
Largest Sulphuric Acid Plant - - - - - 446
Australian Expert Predicts Big Oil-Gas Strikes - - 446
Purifier Set First to Use Rapid Rotation - - - 447
Women Attack Gas Charges - - - - - 447
Gas Central Heating Rush in North West - - 447
North to See Gas at Work in Industry - - - 447
Personal Notes - - - - - - - - 448
Obituary - - - - - - - - - 448
Forthcoming Events - - - - - - - 448

### *TECHNICAL DEVELOPMENTS*

Design and Operation of an Automatic Holder Station. By W. Moorcroft - - - - - 432
Shut-down of a Gasworks. By Malcolm W. Wesley - 438

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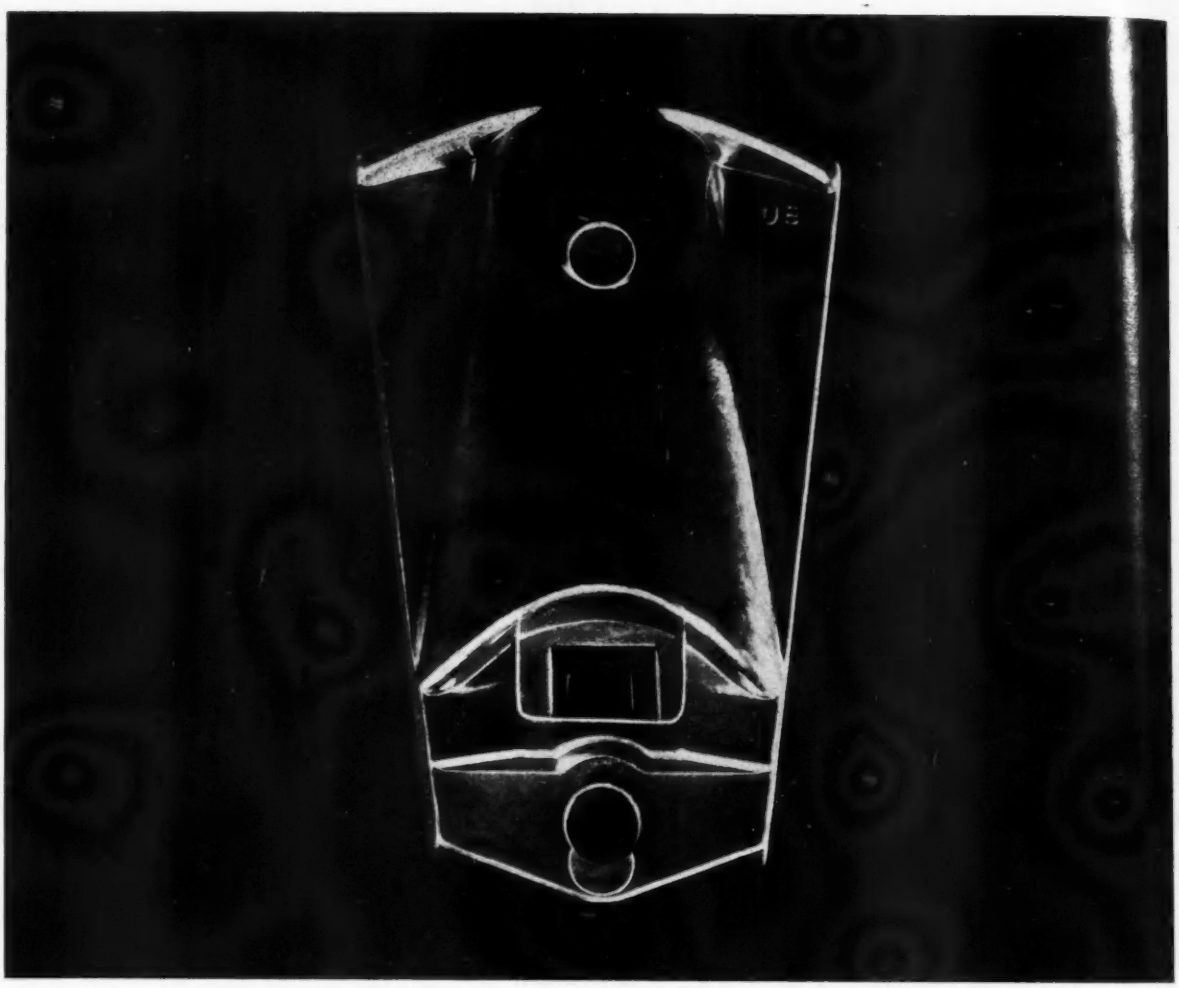

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Gas Journal

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# *Parliament reviews the industry*

LAST week's debate in the House of Commons has shown quite clearly the good favour in which the gas industry is held in certain quarters and the advantages it has gained from its organisation into autonomous area boards. But it must not be supposed that throughout the debate there was unbroken mutual admiration between those who had nationalised it and those who had inherited the responsibility for this relatively trouble-free, enterprising industry, which has made such strides in the last ten years. The record of the industry over these years has been one of steady progress. In becoming 'big business' it has once more confounded the prophets of its early demise.

The Minister of Power, Mr. Richard Wood, was introducing the second reading of a Bill to increase the Gas Council's borrowing powers from its present limit of £450 mill. to £525 mill. to cover the seven years from April, 1959, to April, 1966, since the industry's present limit seems likely to be reached this year.

At the same time the Bill would empower the Minister to recover certain costs incurred by gas testing. Under the Gas Act of 1948, the Ministry is responsible for appointing gas examiners and for their remuneration, including pensions and allowances. Amounting to £110,000 a year, this money can be recovered from the industry. But the Act does not allow the recovery of administration charges at the Ministry itself, including general overheads and salaries connected with this service, which amounts to some £70,000 annually. The Minister argued that, before nationalisation, the costs of gas testing had been borne by the ratepayers but that the 1948 Act had transferred these costs to gas consumers, on whom they could be more reasonably placed. The Ministry charges, however, were carried by the general taxpayer, who in a way had the same relationship to a nationalised industry as the ratepayer had to the local gas undertaking. Their transfer to the gas consumer seemed a logical consequence, though the 1948 Act had not made that clear in spite of it being its obvious intention.

The Minister went on to review the present state of the industry. He made the point at the outset that last year was the first since nationalisation in which it had failed to make a surplus. Steps had been taken, however, to counter this trend by reducing costs and by tariff adjustments, but they might be only partially effective in the current financial year. He hoped that from 1960 onwards the industry would return to its record of modest surpluses.

An important question, the Minister stressed, was from what sources capital for future needs in the industry was to be drawn. The amount by which borrowing powers are to be raised is some £65 mill., which is to cover about six years. The total capital needed over the financial years 1959-1966 is estimated to be about £370 mill., of which £18 mill. will be needed for working capital and £352 mill. for investment. The industry hopes to raise £247 mill. from its own resources—equal to about two-thirds of the total. In the past, the industry has only been able to find about one-third of its own capital. This change for the better is most encouraging. As the Minister pointed out, the industry had to face the effects of inflation in the early years of nationalisation; in the coming period investment would be slower than in the past and therefore provisions for appreciation would form a larger proportion of the yearly investment.

The Minister emphasised that he had every confidence in the financial future of the industry and referred to a recent publication by the Gas Council of the booklet *Gas Looks Ahead*. It was a disappointment that domestic consumption had not increased as had been hoped, although the number of domestic consumers had grown. Gas consumed by industry had made very satisfactory progress and was roughly as forecast in 1954. If further proof of the successful use of gas by industry was needed, a visit to the Gas at Work in Industry Exhibition would reassure anyone who doubted the value of gas as a versatile, industrial fuel.

The question of the future of the open fire and how it can be successfully incorporated into smokeless zones is always difficult to approach. The tendency, with increasing standards of living, towards the use of a piped or wired fuel without the need for any form of storage

clearly favours substituting for the open fire a gas-fired room heater or gas-fired central heating. We are therefore doubtful whether the open fire burning coke or a premium fuel has any real future. Ordinary gas coke is not completely satisfactory for such fires, though most boards make a British Standard open fire fuel, and premium fuels are expensive. Gas making unaccompanied by coke by some modern process is the obvious solution and this could be exploited as the demand for coke continued to fall. This is the old controversy: Is it to be a two-fuel industry or not? It must be considered in relation to the economics of modern advances in gas making and the importation of liquefied methane.

Dealing with these matters, the Minister insisted that consumers should have freedom in their choice of fuel. The gas industry, he said, was still a very large customer of the National Coal Board in spite of its use of coal having dropped in the past few years. Gas from modern complete gasification plants needed some form of enrichment before it was suitable for distribution and this might be conveniently done by petroleum gases. The Minister was careful to stress, however, that before the import of such gases could be on a large scale a licence from the Ministry was needed. He spoke of the progress made between the coal and gas industries and how the respective Chairmen of the N.C.B. and the Gas Council had agreed to consult each other at the planning stage of any major gas-making project in order to ensure that coal was, wherever possible, the raw material used. This, we think, is particularly important, since it does at least appear that the gas industry is now being recognised officially as an excellent customer of the N.C.B.

## *Unanimous approval*

Other speakers in the debate showed strikingly unanimous approval of what the industry has done in the past ten years. Mr. Frederick Lee (Newton) thought that its record entirely justified nationalisation as a means in itself and went on to stress the unreasonableness of the bitter opposition the Government of the day had met when the Act of 1948 was before Parliament. A remark of Sir Harold Smith's in the *Financial Times* of last November about the benefits bestowed on the spread of gas grid systems by nationalisation, was used as additional proof of this contention. We would only add that it might have been this opposition and the vigour with which the Bill was fought in Committee, that caused the Gas Act of 1948 to prove so much more workable as a framework for the new industry than some of the Acts nationalising other industries passed before it. In fact, one speaker later in the debate advocated the autonomous type of set-up for the railways! Mr. Lee was particularly outspoken about the oil industry in Germany and the effect it was having on the coal industry there. He accused the international oil companies of picking a market and dropping their prices below an economic level to make certain of getting into the market, knowing full well that they could recoup themselves when coal had ceased to be a competitor.

Mr. J. H. Osborn (Sheffield, Hallam), in a maiden speech, gave five reasons for intervening in the debate, among them the interest of the gas industry in Sheffield in the supply of industrial gas, the possibility of certain ancillary plant to the steel industry—coke ovens and gas producers—becoming surplus with the installation of the new electric arc furnaces, and the effect of substituting gas- or oil-fired reheating furnaces in place of coal firing on the cleanliness of the city. He spoke also of the relative advantages of oil- and gas-fired central heating plant over solid fuel. These are practical points and Sheffield may not be alone in having the kind of problems to be faced when an industrial city is about to modernise its industry and comply with the Clean Air Act at the same time.

## *Investigating committee suggested*

Mr. R. G. Nabarro (Kidderminster) complimented Mr. Shinwell on the framing of the 1948 Act which had been so far-sighted as to be the cause of so little criticism by the House, but he suggested that a committee should be appointed similar to the Herbert Committee, which had reported on the electrical industry, to investigate the gas industry. After more than ten years, there had been no such investigation in spite of Lord Morrison of Lambeth's advice in 1950 that the public accountability of nationalised industries should be examined every seven years.

Mr. Fitch (Wigan), whose constituency lies in the North Western Board's area, saw in the developments of the new plant being built at Partington the salvation of both the coal and gas industries. During the recession there had been a tendency to reduce metallurgical coke manufacture and so cut off a potential source of gas and the rising stocks of coke were little encouragement to the gas industry to build carbonising plants.

Mr. H. Finch (Bedwellty), representing a Welsh mining constituency, spoke highly of the success of the Wales Gas Board in locating new sources of town gas which were already there for the finding. Naturally he advocated closer co-operation between the gas and coal industries and was glad that that was also the opinion of the Minister.

In replying to the debate, Mr. J. C. George, Parliamentary Secretary to the Ministry, said the feeling should not prevail that the industry was already set fair to greater prosperity without further sustained effort; it did in fact face a tremendous challenge and it must be free to choose whatever weapons were at its disposal. With carbonising coals scarce and expensive, the battle might be lost if it stuck too closely to coal. It was likely that there would be an increase in the use of oil and refinery gases. If, however, the coal hydrogenation process was successfully developed, it would clearly be a tremendous advantage for the coal industry and would probably supersede oil gas-making plants now in use.

Taken all round, this was a most interesting debate marked by a surprisingly deep knowledge of the industry on the part of all the speakers. It left us with the impression that the industry had acquitted itself well during the past ten years and that there were many in the House who were prepared to say so. This encouragement, however, must not conceal the many problems to be overcome in the next few years.

# Commentary on the News

## Oil heaters

THE recent commotion concerning drip-feed oil heaters has had a particular interest for the gas industry, not only because the ripples could have a substantial effect on the competitive position, but because the behaviour of an industry under fire is bound to be watched keenly by another industry, which has also come within the sights of Government, Press and public opinion in matters of safety. The current uproar is notable for two things: The speed at which the affair blew up when no less than three million heaters of this type are in use; and the surprisingly calm way in which the manufacturers are riding the storm by answering criticisms fairly and taking rapid steps to safeguard their appliances and thereby their own position.

The burden of the report by the Department of Scientific and Industrial Research is plainly that if certain steps are taken drip-feed oil heaters can be made safe from the draught risk. Whether they will then be as attractive to buyers has to be proved but in future specifications a higher degree of safety is expected. The Home Secretary, Mr. R. A. Butler, is to be asked tomorrow if he will make a statement on the consultations he has had with the manufacturers; and the Minister of Education, representing the Minister of Science, will be asked why it took so long for the joint Fire Research Association of the D.S.I.R. to report on the safety of these heaters and whether he will ensure that in matters of this kind a quicker method of investigation and report is instituted. Meanwhile, the Director of the National Federation of Ironmongers has suggested the formation of an Oil Appliance Council on similar lines to the Coal Utilisation Council, the British Safety Council has announced that it would award seals of approval for heaters which can be used safely in draughts of up to five miles an hour, and the B.S.I. technical committee is revising the standard for oil heaters of all kinds. In Edinburgh the Town Council's welfare committee have already decided to ban all types of paraffin heaters from old people's homes.

As we said earlier, the gas industry has had its share of criticism on matters of safety because appliances can be dangerous when used incorrectly. The entirely foolproof appliance has yet to be invented, but at least steps can be taken to reduce risks to a minimum. Fortunately for us we have in Watson House an established and highly effective body concerned with the safety not only of the appliances themselves but with methods of fixing. In our dealings with the public do we really make enough of the industry's pre-occupation with their safety and satisfaction? Watson House is not a publicity stunt, but the fact remains that it can be wonderful publicity.

Also useful publicity is the report of the Joint Fire Research Organisation that, in 1958, fewer fires were caused in homes by gas appliances than by space heaters using other fuels. The figures are: Gas 84, electricity 928, oil 2,128 and solid fuel 8,472.

## New list of G numbers

THE recent publication by the Watson House Centre of the Gas Council of a revised list of G numbers for the guidance of appliance manufacturers, showroom staff and others, emphasises the possible advantages that might be gained from a uniform gas quality throughout the country.

Since the setting up of the area boards, a great measure of standardisation of gas quality has become possible and the adoption of the Wobbe index as a means of ensuring constant heat input has contributed greatly to high performances from appliances. The conception of G numbers to cover the ranges of Wobbe indices appropriate to the characteristics of various boards' gas, has made it possible for the manufacturer to turn out an appliance of known performance, the fitting of the correct G number burner being all that is needed for it to be equally efficient in London or some isolated district.

It is, in fact, quite instructive to study the list of G numbers given to form some idea of the problems of gas distribution and utilisation that confront the area boards. The completely integrated board will have a constant G number throughout. The board covering a wide area, much of it rural, will probably be divided into distribution control divisions which may be served by gas of differing characteristics, but uniform in any one division. In the sparsely populated areas served by the Wales Gas Board, for instance, or that outside the central industrial belt of Scotland, observation of the G numbers may show the line of a grid connection or point to the isolated undertaking, as yet too far from a trunk main to be connected to it. Many of these latter use a gas of somewhat unusual characteristics labelled G8, and outside the more standard range of G4 to G7.

The publication itself is most informative and, as well as giving the G number for every undertaking in Great Britain under its particular board or subdivision, explains the meaning and calculation of the Wobbe index and the theoretical considerations for its use.

## A symposium on corrosion

THE recent announcement of a symposium on corrosion to be held in the autumn of this year under the joint auspices of the Institution of Gas Engineers, the Corrosion Group of the Society of Chemical Industries and the College of Advanced Technology, Birmingham, at once highlights the growing importance of a more thorough knowledge of the mechanism of corrosion by the gas and chemical industries.

The symposium will be held on September 23 and 24, 1960, at the College of Advanced Technology, Gosta Green, Birmingham, and attendance will be open to all on the payment of the registration fee—two guineas to members of the Institution, the Society of Chemical Industry and *bona fide* students of the universities and technical colleges, and three guineas to all others.

Altogether there will be four sessions at which the chairmen will be the President of the Institution, the Chairman of the Corrosion Group of the Society of Chemical Industry and the Chairmen of the West and East Midlands Gas Boards respectively.

The subjects to be covered by the papers and discussed at the meetings will deal with the problems associated with corrosion and protection from corrosion of gas production plant, distribution pipe-lines and systems, and fittings and appliances.

There will be contributions by a number of experts from the iron and steel manufacturing industries, the chemical manufacturing industry, as well as the gas industry itself, the latter represented by two papers, one 'The Protection of Gas Service Pipes and Fittings,' by a team under Mr. D. L. Copp, the North Thames Distributing Engineer, and the other, a paper on 'Sulphur Corrosion of Gas Appliances,' by Messrs. F. C. Moody and C. H. Purkis, of Watson House.

*GAS JOURNAL March 16, 1960*

***From a paper to the Manchester District Junior Association of Gas Engineers.***

# Design and operation of an automatic holder station

**By W. MOORCROFT, A.M.Inst.Gas E.,**

DISTRICT DISTRIBUTION ENGINEER, WEST LANCASHIRE GROUP, NORTH WESTERN GAS BOARD.

THE disappearance of statutory boundaries at vesting date provided a new outlook for the distribution engineer, and gave greater scope to the design and implementation of integration schemes from area to area, group to group, and district to district. Grid mains and link mains have been designed and are in operation, enabling production plants to be concentrated at large selected economic manufacturing stations, with the subsequent closing down of the smaller uneconomic plants.

From integration and centralisation of production in the North Western area, out of 104 former manufacturing stations 56 have been now converted to distribution stations, receiving gas by grid or bulk supply main, bringing the total to 87 distribution stations in the Board's area.

The policy of integration, circulated to the responsible persons concerned soon after vesting date, enabled local distribution plant, equipment, and district improvement schemes to be designed on a long term basis to dove-tail into the broad pattern. The design and operation of a future distribution station, being an integral part of this plan, could be based on the implications of the overall picture, and in addition, districts formerly separated by statutory boundaries could be embraced or adjusted to suit economic transmission conditions.

A typical distribution station has been chosen in the Chorley district of Lancashire, which is of medium size handling some 2 mill. cu.ft. per day. This installation has been operating successfully since 1957.

## Centralised production

In the Preston section of the West Lancashire Group of the North Western Gas Board, production has been centralised at the Lostock Hall works, which supplies the areas of Preston, Chorley, Leyland, Garstang and Longridge, all but the latter having been production stations at vesting date. The local grid system is shown in Fig. 1 and was designed to operate initially at 2.25 p.s.i. and later at 5 p.s.i. which were the economic pressures at these particular stages. The system was tested to 50 p.s.i. to allow integration between groups for 'long term' requirements, and to eventually link into the area grid system.

The use of residual grid main pressure to effect economy at distribution stations for local medium pressure systems, was an attractive feature, providing that the grid main was maintained at base load conditions without interference of local peaks. This criterion indicated that any district mains reconstruction schemes should incorporate this feature if found practicable. The distribution station would also have to be suitably designed to receive supplies at a constant rate over 24 hours while distributing a constantly varying output.

Since the Chorley station would be at a terminal leg of the Preston grid supply during the initial and interim periods, the total effective residual pressure at this station was a crucial factor. To enable gas to be transmitted into the station for capacity filling, a pressure above the 14.3 in. w.g. thrown by the heaviest holder would be necessary at the outlet of the relief governor, in addition to a 12-in. w.g. pressure absorption of the volumetric auxiliary controls and inferential measurement, together with a 1-in. w.g.

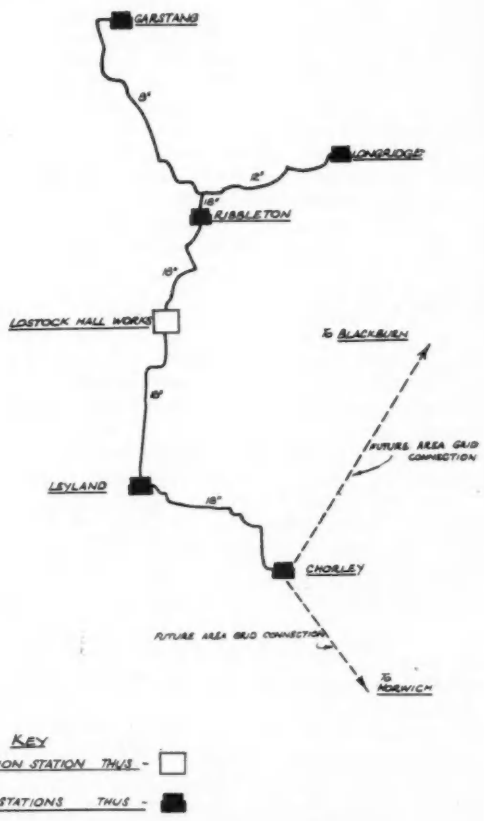


*Fig. 1. Preston area grid supply mains.*

pressure absorption of the relief governor auxiliaries. This would give a minimum terminal pressure requirement of 8 in. w.g. which could be utilised as residual pressure.

Preliminary planning began as early as 1954. Since the future plan of the closure of the production unit was known, work could be carried out, suitably designed to incorporate features of a future bulk supplied station. A detailed survey and examination of the existing distribution system was necessary before any design work could be placed on the drawing board.

It was evident, shortly after vesting date, that the distribution system south of the gasholder site required reconstruction. Pressures at a number of points were approaching statutory limits at periods of peak demand. The system north of the holder site was provided with adequate mains to meet all requirements and in addition, was capable of supplying an area which was at the time being supplied by the neighbouring station of Leyland; this area of supply could be integrated into the Chorley system following the removal of the statutory boundary, with considerable improvement in economic transmission conditions.

## Adequate storage

The gas holders and governor house were built on a modern walled-in site, situated a quarter of a mile from the production station where the compressors and steam raising plant was sited. Adequate storage of 1.87 mill. cu.ft. capacity was available with a minimum pressure throw of 6-in. w.g. The governor house was large enough to accommodate all future terminal equipment including boosters. The compressors consisted of one 75,000-cu.ft. per hour steam driven set and one 90,000-cu.ft. per hour electrically driven set. There were three station governors, all of the water sealed type. The high pressure mains system to the south consisted of 6-in. steel mains with short sleeved lead joints laid in 1910. The mains had been laid at a very shallow depth, and during the intervening years had suffered extensive external and internal corrosion. The h.p. system was the sole supply to three districts in addition to reinforcing the low pressure system. Two steam boilers were necessary, one acting as standby for repairs and insurance inspection, with associated annual charges. A 24-hour shift system was also necessary to look after the plant, compressing for 18 hours per day at 7 p.s.i.

Existing and proposed development was indicated on a map of the district after direct consultations with the local and county planning authorities. Visits were made to industrial and commercial premises for existing and future load assessments, and the area sectionalised on the appropriate Ordnance Survey map for point loading. Tables of the existing and estimated growth of annual sales were prepared and sectionalised into the appropriate areas.

A comprehensive pressure and flow survey was carried out giving both peak and off-peak conditions. The capacity of the low pressure system was examined. Two bottlenecks to flow were rectified during the initial period, and for design purposes a total pressure drop of 2-in. w.g. allowed on this system, giving a differential of 6-in. to 4-in. w.g.; the balance was to be provided by a new medium pressure booster system, as indicated on the flow and area diagrams.

Differing schemes were designed, modified and compared. The scheme decided upon was to augment the medium pressure system so that the initial pressure at peak instant demand load would be 90 in. w.g. This scheme was flexible enough to meet changes in conditions, renewed the defective part of the existing system, and embraced part of the neighbouring undertaking of Leyland, which suited the design and economics of that station which was also under consideration.

The high proportion of residential properties in this area gave a relatively high noon peak load. The new mains would be adequate to supply the off peak volumes at very much lower pressures. Further, by district governor pressure settings, adequate reinforcement volumes would be delivered to the low pressure mains near perimeter points to augment this supply at peak periods only, and would be automatically closed by the low pressure system as the peak passed, and maintain proper load factor. The station governor outlet pressure being set slightly higher than the reinforcement governors.

One of the factors which influenced the design work was the designed terminal pressure of the grid supply main for the utilisation of residual grid pressure at off peak periods. The grid supply and terminal pressure were ample to meet the medium pressure off peak requirements with the balance to be passed through a relief governor to the low pressure system and gas holders. Boosters would be required to cater for the peak instant demand loads, and to act as standby for grid failure. It was evident that, by utilisation of residual grid pressure, by considered and careful design of the receiving equipment at the station, re-compression costs would be reduced to the minimum and could reduce the existing distributing costs per therm.

The proposals also cleared the adjacent production site of distribution equipment, which would allow this site to be disposed of at a later date, and concentrated all plant on the future distribution site adjacent to the gas holders.

Consideration was given to the control of the station together with safety of continuity of supply. Remote control and indication were attractive, but marred by annual costs of manning control and annual charges during the intermediate periods. Longer-term considerations indicated that connections to the area grid would require remote control through an area grid controlling station, or stations, and that any equipment and instruments installed should be adaptable to this form of control. The station would require part time attendance for inspection and maintenance of the two holders, and for site cleanliness, utilisation of this part-time attendance could be made.

## Continuity of supply

From these considerations a clock-controlled automatic station was designed, adaptable for remote control, with features incorporated to ensure continuity of supply if one or more sources failed. This is shown more clearly in Fig. 2.

The information for sizing the equipment was readily available from the district survey work and the data collected. Automatic routeing of gas flow was made by the use of non-return valves.

The boosters required were identical plants. One was to be driven by electric motor and the other by diesel engine, either plant acting as standby to the other. The room adjacent to the booster was suitably flame-proofed from the governor room, and was to house the electric motor and diesel engine, together with their starting panels and ancillary equipment.

The whole of the existing equipment in the governor room was removed, while continuity of supply was maintained, to make room for the governing plant and boosters to the layout plans designed to suit the existing dimensions. A room, hitherto used as a laboratory, was utilised as an instrument room for the main instrument panel and metering elements, with a 6-ft. sq. plate glass window, suitably flame-proofed, inserted in the adjoining governor house wall, with the pilot volumetric governor fixed directly at the other side. The small passage was used

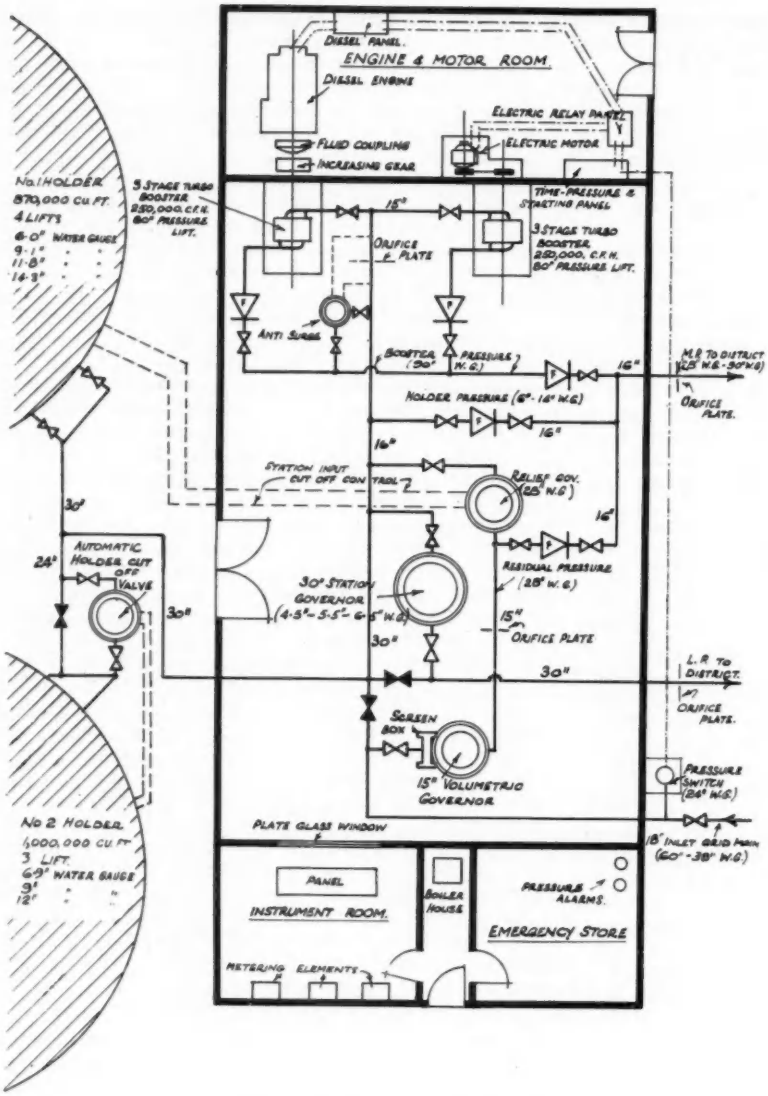


*Fig. 2. Diagrammatic layout of equipment at Chorley holder station.*

to house a telephone and gas-fired central heating boiler, with the adjoining room utilised for battery-operated low-pressure alarms and an emergency store-room for local district emergency work.

Refering to Fig. 2, gas flows at a constant rate from the grid main through a 15-in. diameter medium pressure outlet type volumetric governor, and flows through the orifice plate which is utilised both for volumetric governor control and inferential measurement of gas input to station. Gas then flows to the 15-in. diameter branch pipe to the medium pressure system and also to the clock-controlled relief governor which is set to relieve pressure over and above 28 in. w.g. The four main objects of this relief governor are:

1. To maintain 28 in. w.g. in the measuring pipes between its inlet and the outlet of the volumetric governor for the medium-pressure branch supply, and avoid fluctuations in pressure.

2. To close when the holders on the station are full by means of a three-way cock and the holder cut off gear, yet not shut off the medium pressure on the grid supply.

3. To be out of action, but under holder control during 'night hours' to reduce the medium pressure system to holder pressure during these hours by use of the three-way cock under clock control.

4. To close if grid pressure falls below 28 in. w.g.

Excess gas which passes the relief governor flows to the common holder outlet manifold and the inlet of the station governor. Any excess volume not required by the low-pressure system through the station governor passes into the holders.

Gas flowing down the medium pressure branch at 28 in. w.g. will open its own non-return valve, will close the 16-in. diameter non-return valve on the booster outlet and the safety non-return valve from the holder manifold, and flow direct to the district medium-pressure feeder main.

The boosters for the medium-pressure system are supplied from the common holder manifold with an orifice

plate fitted for antisurge during pre- and post-peak periods. Each booster has its own 16-in. diameter non-return valve immediately on its outlet.

When a booster is started for peak periods and throws a pressure of 90 in. w.g., the flow closes the non-return valve on the adjacent booster, opens the non-return valve on the common booster outlet, and flowing to the medium-pressure system and closing the non-return valve fed by the grid main, automatically takes over the medium-pressure system from the grid supply. A reversal of this sequence automatically takes place when the booster is shut down.

## Governing and boosting plant

All the governing and boosting plant was supplied by, or through The Bryan Donkin Company of Chesterfield and consists of:

1. The station governor, which is 30 in. in diameter with 24-in. valves, and has been installed for the interim period only. The diaphragm is internally loaded with an inspirator and is clock controlled; there are separate auxiliary governors for the three pressures required. A safety governor is fitted to vent the underside of the main governor diaphragm to atmosphere under fault conditions to give full cover.

2. The volumetric governor, fitted with a 15-in. diameter diaphragm, is internally loaded with a screen box at its inlet and straightening grid at its outlet. A pilot volumetric governor has been installed opposite the window of the instrument room with the object of limiting the governor fitted in the auxiliary system.

3. The relief governor, also fitted with a 15-in. diameter diaphragm, is part of the auxiliary system and is connected to the three-way cock of the heavy holder cut-off gear. A separate clock-controlled three-way cock in the auxiliary system puts the governor out of action during 'night hours.'

4. The non-return valves are of the dished, fullway, faced type and balanced, but without dashpots.

5. The booster anti-surge gear consists of an 8-in. diameter connection common to both boosters. It is controlled by orifice plate at the common booster inlet and opens the by-pass at any fall in the differential pressure.

6. The holder filling control. The lighter holder is controlled by a 24-in. diameter automatic holder valve which is actuated by a three-way cock operated by plates fitted to the holder, and falls open on the decrease of the inlet pressure. The heaviest holder is also controlled by a three-way cock operated by plates fitted to the holder, and shuts off the relief governor when both holders are full.

Perhaps the most interesting items, and certainly those requiring further consideration for an automatic station, are the boosting plant and its ancillary equipment.

The two boosters are identical except that one is electrically driven and the other diesel driven, either acting as standby to the other. With a capacity of 250,000 cu.ft. per hour at 80-in. w.g. pressure lift, they are of the 3-stage Rateau type, fitted with white metal bearings, a forced feed lubrication system and water-cooled oil-coolers.

The motor of the electrically-driven plant is a non-flameproof, slip-ring, induction type, developing 110 b.h.p. at 1,480 r.p.m. The indirect drive is by a flat nylon type belt through a flame proof wall box at 4,750 r.p.m. There is a starting panel, a remote and automatic control panel, and ancillaries which include a pre-wound selective time switch.

On the diesel driven set there is a separate master panel for the engine and ancillaries. The 3-cylinder engine, developing 121 b.h.p. at 600 r.p.m. is water cooled and is of the totally enclosed compression ignition type, fitted with an automatic control panel and starting gear. Among the ancillaries are a 24-V, 325-A hour lead acid batteries, a dual rate trickle charger and a cut-out control. The drive is through a fluid coupling to a parallel shaft, though a speed-increasing gearbox which raises the shaft speed to 4,750 r.p.m., to the booster shaft through a flame-proof wall box. Both plants have discriminating protective features incorporated.

There were two problems which required further consideration:

1. Either booster might be stationary for up to six days, so that the usual method of hand priming was out of the question. It was, therefore, decided to fit small electrically driven oil pumps as the primary starting function. Operated through oil pressure switches, they were so arranged that the selected booster would not run until oil at pressure was available at the booster bearings.

2. The oil coolers required 250 gal. of circulating water per hour when the booster was running. Continuous water supply would be wasteful, and hand control out of the question. To overcome this problem on the diesel set, a split pulley was fitted to the engine shaft from which a self-priming type pump was driven. In this way water was drawn from the adjacent gasholder tank passed through the oil coolers, and returned to the holder tank.

Since a similar arrangement was not possible on the electric set, a small electric motor, wired to the main motor starting circuit, drove a water pump with separate water suction and return pipes to the gasholder tank.

A starting sequence was evolved for operating the electrically driven booster. From data collected, the incidence and duration of the local boosting period or periods, could be pre-selected at the time switch. When the starting circuit was closed by this time switch, a small electric driven oil priming pump would first start up. When the oil pressure had reached 8 p.s.i., the first oil pressure switch operated and started the main motor driving the booster. The booster pump raised the oil pressure to 12 p.s.i. during the accelerating period and by operating the second oil pressure switch shut down the oil priming pump. The booster would then be running at normal speed and under normal conditions.

## Trip device

In the operation of the diesel driven booster the sequence is similar, but the priming pump is driven from batteries in a 24-V circuit. During the priming period, an oil pressure operated piston pushes the fuel rack on the injector pumps to the 'start' position. When the oil pressure to the booster has reached 8 p.s.i. a pressure switch initiates the electric starter motor through time relays at the motor master panel. When the engine fires and accelerates towards full speed, secondary pressure switches cancel the starting cycle, stop the oil priming pumps, and switch on the 'engine running' light and protection devices. The plant by now is running under normal conditions. The engine is stopped by an electrically triggered, spring controlled, trip device which cuts off the fuel supply by actuating the fuel pump rack.

Both plants are under the control of a low grid pressure switch and the time switch, which in turn can be overridden by a holder low limit switch, an oil failure switch, and emergency flameproof lock-out switches adjacent to the boosters. Either plant can be selected as the working booster by a diesel/electric/off switch, and a hand/off/auto control switch. Normally the diesel set acts as standby.

If the electric set has been selected, and a power failure occurs, the diesel set starts up automatically through a relay at the 'motor master' panel, and continues to run

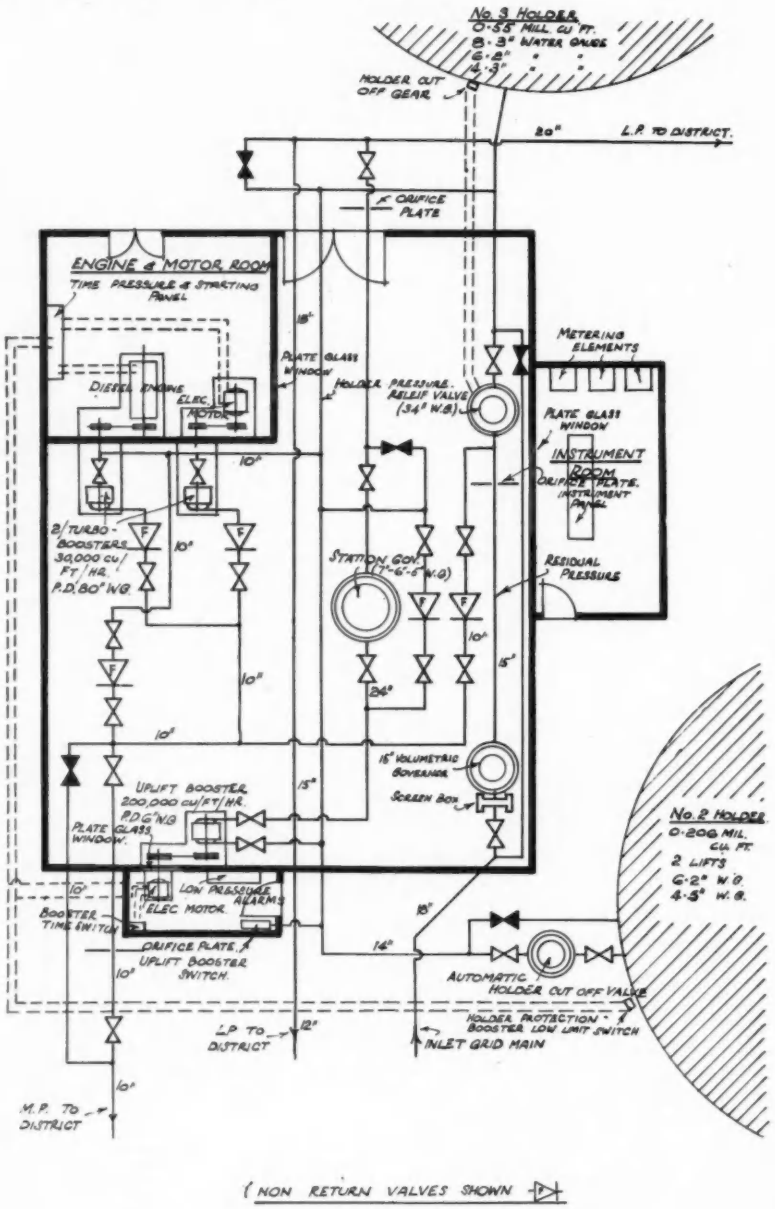


*Fig. 3. Diagrammatic layout of equipment at Leyland holder station.*

under control of the time switch by latch out relay even though power is restored. On the next sequence, the electric set would start up if it still remained the selected set. If the grid main pressure falls short during daytime off-peak periods, a gas pressure operated switch will override the time switch and start the booster selected. This gas pressure switch is made inoperative during 'night hours' by clock control.

The instrument panel can be adapted to remote indication. It is sited opposite a flame-proof window in full view of the governor-booster room, illuminated by angle fluorescent lighting. The recording instruments are of seven-day rotation with an integrator for the station input. 'U' gauges are fitted as an integral part for the checking of instruments. There are metering elements in the same room for measuring the gas flow to station, the gas flow to the medium pressure system, and the gas flow to the low pressure system.

At first it was visualised that it might be necessary to alter the flow into the station at frequent intervals by daily adjustments of the clock controlled auxiliary pilot volumetric governors. In practice, this has not been so and hand adjustment is only necessary to cater for changes in season at about three monthly intervals. A constant base load throughput from the grid is maintained which coincides with the other distribution stations.

The station is visited daily by a trained attendant. He is responsible for reporting stocks at given times, checking holders, the maintenance of fuel oil and oil levels, changing weekly charts, the general security and cleanliness of the station, checking batteries, and the upkeep of the station log book. A visit is made one day a week by the governor

maintenance fitter for clock winding and scheduled maintenance. A six-monthly visit is made by the electrical engineer for electrical maintenance. Pressure alarms are fitted to prevent mistakes when carrying out site maintenance, and are checked daily by the attendant.

The certainty of supply is made within all reasonable limits by the interconnecting of one system to another. Through the use of non-return valves, the medium pressure supply has three initial sources, boosted, grid, and holder supply. The low pressure system is safeguarded by a safety governor, district reinforcement from the medium pressure mains, and is interconnected at perimeter points to neighbouring districts.

Graphs showing stock, outputs, and volumetric governor settings are maintained at the distribution centre. The object is to maintain the maximum load factor into stations at all times with the volumetric governor settings remaining constant over long periods. Stock at stations is gradually lost during each week, and is recovered over Saturdays and Sundays when output is substantially decreased. The stations under these conditions are full to the point of shutting off by 6 a.m. each Monday morning when the cycle is repeated.

### Other distribution stations

The other distribution stations on Preston grid supply are:—

1. Leyland, which is fully automatic with similar equipment to that at the Chorley station, but with the addition of a pressure uplift booster fitted to the inlet of the station governor to augment the pressure, and make the whole of the holder capacity effective. At this station, the minimum holder pressure is 4.3 in. w.g., while the minimum required outlet pressure at the station governor is 5 in. w.g. The booster is operated automatically by a pressure switch, and the boosted gas routed by non-return valves. A diagrammatic layout of this station is shown in Fig. 3.

2. The Ribbleton—Preston, station is fully automatic with the low pressure system balanced, and connected to the low pressure mains from the production station at Lostock Hall, Preston.

The major problem here was the vastly different pressures thrown by the gas holders; the heavier holder with four lifts throws 16.2 in., 13.5 in., 10.6 in. and 7.6 in. w.g. respectively, while the lighter holder with two lifts throws 6.4 in. and 4.3 in. w.g. respectively. This problem was overcome by the fitting of a combined relief and automatic holder cut-off valve to the lighter holder, and the installation of a holder transfer booster operated by holder control switches.

The relief governor is set at 15 in. w.g. and opens during periods of low district demand before the pressure can lift the fourth lift of the heavier holder, thus filling the light holder. The relief governor is closed by the holder gear on the lighter holder when full, which then allows the pressure to rise in the intake manifold and fill the fourth lift of the heavier holder which controls the intake into the station through the volumetric governor.

During periods of high demand, *i.e.*, Monday to Friday, stock is gradually depleted in the heavy holder—intake from grid remains constant—until it is almost at the 'crown lift.' A switch is then operated by a plate welded to the holder which starts the booster and transfers the gas from the lighter holder into the heavier holder, until switched off by a second plate fitted to the third lift, which actuates the booster switch to the off position; the lighter holder is protected by a booster low limit switch.

The cycle of filling the lighter holder is then repeated during the weekend at periods of lower volume of district demand.

3. Garstang is a small two holder station, fully automatic, and does not require uplift boosters or a medium pressure system.

4. Longridge is a very small station with one holder. Interconnection with the district mains system from Ribbleton and a safety governor in the process of being fitted will remove the necessity of a holder on this district.

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## *NEW PUBLICATIONS*

# Coal tar technology

VOL. 11, part 1, of the *Review of Coal Tar Technology*, which was published recently, covers the period of January to June, 1959. As always, this publication contains a great deal of information and the number of periodicals reviewed, both English and foreign, continues to be as exhaustive as ever.

According to custom, it is divided up into two main sections, the first covering coal tar and coal tar products, and the other general chemistry and chemical techniques.

Those works which refine their own crude benzole or distill their own crude tar, will certainly find the first part of absorbing interest, especially those items dealing with coal tar itself, primary fractions, tar acids and tar bases. The section on the utilisation of coal tar deals with practical applications and we were interested to see references to experiments on solid smokeless fuel manufacture by the National Coal Board and others.

Undoubtedly the chief value of a publication such as this is the thorough examination of foreign scientific literature by the editors.

# Fuel efficiency

THE 1960 issue of *Fuel Economy Review*, published by the Federation of British Industries, contains an article of direct interest to the gas industry by K. A. Steele of George Kent Ltd. on 'Control of flame characteristics by the Wobbe index value.'

### Need for perspective

In another article called 'The coal industry facing the challenge,' Sir James Bowman, Chairman of the National Coal Board, discusses the abnormally large stocks now being carried at the collieries and how important it is to get these into their proper perspective.

The development of fuel efficiency over the last five years is the subject of another contribution which describes the development and use of fuels and their more economic utilisation.

# Tubing standard

REQUIREMENTS for three types of tubing are specified in the second revision of B.S. 669, which deals with flexible tubing and connector ends for appliances burning town gas. The types are: (a) Flexible non-metallic tubing and connector ends for domestic portable appliances, (b) general purpose flexible metallic tubing for domestic portable appliances, and (c) heavy-duty armoured flexible tubing and connector ends.

Copies may be bought from: British Standards Institution, Sales Branch, 2, Park Street, London, W.1. (5s.—plus postage to non-subscribers.)

*GAS JOURNAL March 16, 1960*

*From a paper to the Manchester District Junior Association of Gas Engineers.*

# Shut-down of a gasworks

**By MALCOLM W. WESLEY,**

STUDENT APPRENTICE, MANCHESTER GROUP,
NORTH WESTERN GAS BOARD.

ROCHDALE ROAD works of the Manchester group of the North Western Gas Board is operated as a base-load station making at the time of the shut down 7 mill. cu.ft. of gas per day. The gas is made in a West's continuous vertical retort house, with retort monoliths of Board design. There are three benches: No. 1 consists of 32 retorts in beds of eight and units of four, which are heated by four individual steam-air blast step-grate pressure producers. The No. 2 bench has 32 retorts arranged in a similar fashion to the No. 1 bench, but heated by four individual atmospheric step-grate producers. No. 3 bench is similar to the No. 2 bench, except that it consists of two beds of eight instead of four. The first bench is a balanced heat setting and Nos. 2 and 3 benches are of the older type with the producer gas flue in the front wall.

There were 72 retorts working at this time, eight retorts on No. 2 bench having been shut down for inspection and maintenance.

No. 1 bench is controlled by an Arca governor, and Nos. 2 and 3 benches by bell-type governors. Waste gases are fed into a common waste gas-flue, to which are connected two waste heat boilers. At the time of the shut-down, only one boiler was in operation.

## Two steam ranges

The steam turbine driving the fan and the feed pumps can both be operated directly from the boiler. The coke extractor is of the worm-type and the discharge is fed on to a system of conveyor belts which transports the coke to the grading or storage hoppers. The works has two steam ranges: The high pressure range fed from the waste heat boiler, and also if needed, from four Lancashire boilers; the low pressure range at 12 p.s.i. is supplied by exhaust steam from prime movers, and when necessary, through a reducing valve from the high pressure range. The wet and dry purification plant is shown in Table 1.

TABLE 1

| No. of Units | Type of Plant | Design throughput capacity Mill cu. ft. per day |
|---|---|---|
| 3 | Condensers | 7·5 |
| 3 | Exhausters | 14·4 |
| 2 | Detarrers | 6 |
| 1 | Static washer | 5 |
| 1 | Liquid purifiers | 3 |
| 3 sets | Dry box purifiers | 5·5 |
| 1 | Zinc acetate washer | 8 |
| 1 | Activated carbon plant | 6 |
| 2 | Connersville meter | 8·5 |

Neither the benzole plant nor the zinc acetate washer was in operation.

The object of the shut-down was threefold:—

1. To renew a purifier box cover.
2. To connect two second-hand static washers into the gas stream.
3. To modify connections between the static washer and the liquid purifier. Prior to the shut-down the gas was passed through the static washer before the liquid purifier. It was intended to modify the connections so that the liquid purifier could be brought into the gas stream before or after the static washer.

During the shut-down 56 other jobs, repairs and modifications were to be carried out on the ancillary plant, steam ranges and in the retort house.

It was proposed to stop the production of gas over a period of two nights. On the night of July 23, Nos. 2 and 3 benches were to be shut down. On the night of July 24, No. 1 bench was to be shut down. During July 22 the coal bunkers for Nos. 2 and 3 benches were estimated to become empty between the hours of 8 p.m. and 2 a.m. over the night of July 23. Similarly, during the night of July 23 the same was carried out for No. 1 bench. Throughout July 23 the c.v. was kept as high as possible. One of the two working exhausters was to be shut down after the last bed of No. 2 bench was turned out.

During July 23 it became obvious that the coal bunkers would require trimming. Tests for CO content in the bunkers were carried out, using a Minchin double aspirator and CO testing tubes. It was also obvious that the timing of the bunkers to empty of coal was not exact, but correct to an hour. The trimming of the bunkers was carried out throughout the evening. CO tests had to be below 0.02% CO before trimming in a bunker was allowed. Permits were issued stipulating the following precautions:

(a) That the safety ladder was in position,

(b) that the men wore safety belts with ropes controlled by men above the bunkers, and

(c) that men worked in the bunkers for short spells only.

Throughout the night No. 1 bench was operated as normal and coaling up on Nos. 2 and 3 benches was done as trimming allowed. Arrangements were made for the plating-up of the retorts, *i.e.*, to allow no more coal through the coal valves by pushing a plate across the mouth of the valve. The difference in timing of plating-off individual retorts was due to trimming and retort characteristics. The extractor was being run faster than usual to maintain a high c.v.

## Coal bunkers plated-off

At 10 p.m. coal bunkers on beds Nos. 8 and 9 became empty and both beds were plated-off and the extraction on these retorts speeded up further. Consequently as the c.v. was high, gas could be contained in the main for a longer period and less gas would pollute the atmosphere. At 11.30 p.m. No. 7 bed was ready to be plated-up. At 12 midnight a test was made to see the amount of oxygen

in the gas entering the purifiers. This was found to be satisfactory. The c.v. began to drop slightly as No. 8 bed began to produce thin gas and the bed was then ready to be taken off. The stack valve on the bed was slowly closed and at the same time the blow-off valve opened, thus maintaining a pressure all the time below this valve. Thus when the stack valve was shut and the blow-off valve fully open, the bed was isolated and the gas vented to atmosphere. After this had been carried out, a further oxygen test at the inlet of the purifiers revealed an excess, and this was consequently reduced. As the c.v. dropped again the next bed was taken off. When both Nos. 8 and 9 beds were off, the main No. 3 governor, inlet, outlet and by-pass valves were shut, and the bench isolated.

By taking the beds off slowly, pressure was kept on the retort tops and also a slight pressure on the retort bottom ironwork. This greatly reduced the chance of air infiltration and consequently hot ironwork and hot discharges. Nos. 5 and 6 beds were plated-off and the extraction speeded up. The pull from No. 2 exhauster was progressively reduced. By watching the c.v. it was known when the next bed was ready to be taken off. At 3.20 a.m. the last bed was ready to be taken off, and as this was shut down, No. 2 exhauster was stopped, leaving one exhauster and one detarrer to deal with the remaining make from No. 1 bench which was about 153,000 cu.ft. per hour. The inlet and outlet valves on the governor for Nos. 4 to 7 beds were now shut so that the whole of Nos. 2 and 3 benches were isolated. The detarrer was then reset to take the load and all the ancillary plant adjusted. During the night a careful watch was kept on the discharges to ensure that they were cool. The foul main for Nos. 5 to 9 beds was then fully isolated with all stack valves, inlet, outlet and by-pass valves on the governors shut. The main was then pressurised up to 3 in. w.g. by connecting a gas supply to the foul main, which was kept under pressure all the time to prevent an air-gas mixture.

## Extraction speeded up

During the night of July 24, a high c.v. was again maintained from No. 1 bench and the bunkers on Nos. 1 to 3 beds were trimmed. As the bunkers became empty of coal they were plated-up, the extraction speeded up and precautions taken to ensure discharges were cool. When a bed began to produce low c.v. gas, the bed was taken off, the steam to the producers shut-off and the producer doors opened. The exhauster was progressively reduced. At 3 p.m. the last bed was ready to be taken off and the following procedure carried out:

1. The detarrer by-pass was opened.
2. The high pressure gas to the detarrer was shut off and then the detarrer shut off.
3. No. 3 bed was opened to atmosphere and the exhauster shut-down.
4. The inlet and outlet valves on Nos. 1a to 3 beds were shut.

All mains on the suction side of the exhauster were pressurised by cracking the exhauster by-pass and backing gas at holder pressure through the detarrer by-pass and retort house governor by-passes to the benches.

The following valves were then shut: (a) The inlet and outlet retort house governors, (b) the inlet and outlet of both station meters, (c) the zinc acetate washer by-pass.

The plant was then ready for testing for leakage in the mains normally working under vacuum and then purging.

Before the pressure in the steam ranges could be completely dropped, steam had to be used to pump liquor to the retorts to flood the collecting mains. This will be explained later.

After the last bed had been shut down the waste heat boiler was set so as only to carry its load of the feed pump and steam turbine. The diesel high pressure gas compressor was switched on and the steam compressor shut-off.

Two Lancashire boilers on slow fires were drawn and slacked down. Later the steam turbine and liquor pumps were exhausted to atmosphere, thus isolating them from the l.p. steam range. After checking that the feed pump and steam turbine were operated directly off the boiler, the boiler was isolated by shutting the outlet superheater valve, the drain-cock on the superheater being opened slightly so as to prevent overheating of the superheater tubes. The boiler was further isolated by shutting the isolation valve between the boiler and the h.p. range. The range was dropped by motoring the steam turbine driven booster with the gas valves shut and exhausting to atmosphere. The l.p. range was exhausted by moving the weights from a relief valve. When the pressure on the ranges was atmospheric, maintenance on the steam ranges were carried out.

## Ancillaries purged

Gas mains and all ancillary plant must be purged for safety reasons. The purging machine used produced 10,000 cu.ft. of purge gas per hour, with a $CO_2$ content of 13%. It was connected to a flange on the syphon on the outlet of No. 4 condenser and the purging machine exhaust was carried above the condensers, which were situated near the purifiers. Cooling water was taken from a nearby hydrant and discharged to an adjacent sewer. The collecting mains on No. 1a bed on No. 1 bench were flooded by blocking the liquor run-off with a wooden plug, the liquor supply being turned off when the liquor appeared in the bottom of the off-take pipe. This was carried out to obviate any possibility of an air-gas mixture reaching the top of the retort. Valves were then arranged so that the purge gas passed through the inlet of No. 4 condensers back to the retort house, Nos. 2 and 3 condensers being isolated.

The governor, inlet and outlet and by-pass valves were opened in turn on No. 1 bench; the stack and blow-off valves on No. 1a bed opened, until the Orsat test indicated that coal gas was no longer present on No. 1a bed. A similar procedure of flooding each of the collecting mains in turn and purging through the stack valves and blow-off valves was carried out, until satisfactory results were obtained in each case. After purging, each collecting main was reduced to normal. Nos. 2 and 3 benches were purged in a similar manner.

After all beds had been purged, all the stack valves in the house were shut. By then, No. 4 condenser was purged and thus by opening the inlet of No. 3 and removing a flange on its outlet, this condenser was purged, after which the flange was replaced. No. 2 condenser was dealt with in similar manner. The flanges were removed by men wearing respirators.

Throughout this procedure, the exhauster, inlet, outlet, and by-pass valves were shut. A cock was opened on a 'dead' section of condenser inlet manifold main and this section purged. The exhauster by-pass was opened and the inlet valve of one of the detarrers opened. The gas was blown to atmosphere by opening a cock on the top of the detarrers. After tests showed this vessel satisfactorily purged, the inlet valve and cock were shut and the other detarrer purged in the same way. The blow-off cock was then shut and the outlet of the detarrer was opened and the purge gas passed through to the static washers.

The inlet and outlet valves of the washer were opened and the purge gas blown to atmosphere by a 6-in.

air connection at the inlet purifiers. When satisfactory tests were obtained, the detarrer outlet was shut and the by-pass opened. The inlet and outlet valves to the dry-box purifiers were shut during these operations. The inlet and outlet of the static washer were then shut and the by-pass valve opened. The inlet and outlet valves of the liquid purifier were opened, the gas being blown off through the 6-in. air connection. When this vessel was purged satisfactorily the inlet and outlet valves were shut and the by-pass opened.

The dry-box purifiers were next to be purged. The inlet and outlet valves of No. 3 set of purifiers were opened. It had been proposed to purge the boxes in rotation through the outlet and blow-off at two pipes further down the main. However, a much quicker method was found, and the three sets of purifiers were purged by this method. The gas was sent through one box and out into the common outlet main. The gas was then sent through the outlet of any box in turn, flowing upwards through the box and being blown off at a plug on top of the box. Thus, instead of the coal gas mixing with purge gas and slowly moving down the main, the upward movement of the purge gas pushed out the coal gas. Pressure was allowed to build up in the box to about 15 in. w.g. and then the plug was removed. The sudden upward rush of gas produced a swirling effect and gas pockets in the corners of the boxes were broken up. The plug was replaced at about 2 in. w.g. to ensure no air, was sucked in and the pressure allowed to build up again. Each box was purged by this method until tests showed no coal gas was present. The other two sets were purged in the same manner.

The last plant to be purged was the zinc acetate washer. The plant by-pass was shut and the inlet valve opened. The purge gas was blown off at a cock on top of the washer. The by-pass was then opened and the inlet valve shut. The gas was blown off at a cock on the main, between the washer and the benzole plant by-pass. When tests indicated that no coal gas was present the zinc acetate inlet valve was opened and this section of main purged again. All holder inlets were then isolated and the benzole plant by-pass opened. The mains as far as the meters were purged and the gas blown off at the meters. The final position of valves was the benzole plant by-pass shut; the zinc acetate by-pass shut; the inlet and outlet zinc acetate washer shut. Both the purge pipes on the shut-off section, between the zinc acetate washer and benzole plant, were opened. This ensured a vented section between gas and purged main.

## Jobs checked for start-up

It was proposed to restart gas making during the night of Friday, August 7, and the morning of Saturday, August 8. Careful consideration was given to each aspect of the 'start up.' During Wednesday and Thursday, foremen and supervisors went around the works checking that proposed jobs were in a state of near completion. Any important jobs were given priority or a compromise reached, which would not hinder restarting gas making.

On August 6 coke was conveyed to the coke bunkers ready for coking of the retorts. During the shut-down the waste heat boiler had been taken off for flue repairs. On the night preceding the start-up, the waste gases were fed into the boiler gradually, and by the next morning all the gases were passed through the boiler, and steam raising began. Liquor spray extraction gear and conveyors were checked before gas making began. Airborne sealing was carried out on all retorts before the coking of the retorts commenced.

Several plants had been opened up to atmosphere during the shut-down and it was necessary to purge again. On the Thursday the purging machine was attached to a flange on the outlet of the dry-box purifiers main. Valves were arranged so that the gas passed forward through the zinc acetate washer, thus purging the vessel, and being blown off at a purge pipe near the benzole plant. When this section was purged, a test showed about 13% $CO_2$ and no $O_2$. The zinc acetate washer inlet and outlet valves were shut and the by-pass opened. Purge gas was then passed through the benzole plant by-pass as far as the meters, where it was blown to atmosphere. The blow-off pipes were shut and the zinc acetate by-pass shut, thus causing the gas to flow back to the ancillaries.

Blowing off places were the 6-in. air connection at the inlet of the purifiers, the cocks on the detarrer, and finally the blow-off valves in the retort house.

## Purging complete

When this was completed, the purging machine was removed and the flange replaced. It was then proposed to purge back with coal-gas as far as the purifiers. This was carried out by opening the holder inlet and passing gas back through the meter by-pass at holder pressure. The benzole plant by-pass and the zinc acetate plant by-pass were opened and the gas passed into the purifiers. The purged gas in No. 1 set and also the zinc acetate washer were displaced by coal gas, by opening the outlet and inlet valves and shutting the by-pass. After this had been carried out, the zinc acetate inlet, outlet and by-pass valves were shut. It was then proposed to start gas making and pass coal gas through the plant up to the purifiers, exhausting the gas to atmosphere at this point, until the quality of the gas was satisfactory.

On the Thursday night the retorts were filled with coke and left to stand until about 6 p.m. on the Friday. During this time heats were brought up to the required temperature. On Friday evening the extraction was started slowly and coal fed into the retorts. The stack valves were shut, liquor level dropped to normal in the collecting mains, and the gas blown to atmosphere through the blow-off valves. Each bed was coaled up in turn, so that all the beds were not producing gas at the same time. The doors on the S.A.B. producers were shut and the steam turned on. Steam and water were put on the retorts in a small quantity.

When every retort in one bed was producing good gas, it was ready to be turned in. Prior to this the gas flow was arranged so as to flow through all the condensers, the detarrers, the washers and the purifiers. Plugs on the foul main were removed before opening the stack valve on the bed, and the gas blown off there for a few minutes before passing it through the governor by-pass The exhauster was idling with the by-pass fully open. As each bed in turn started to produce good gas it was turned in and the exhauster by-pass progressively closed. Both detarrers were off, but the condenser and ammonia washers through which the gas was passing, was given a supply of water. A pressure was maintained on the purifiers to prevent the ingress of air.

When all the beds had been turned in, a test to find the amount of $O_2$ entering the detarrers was carried out. When the $O_2$ dropped below 1%, one detarrer was switched on at a low figure. As the make increased, more water was added to the condensers and ammonia washers Gas analysis was carried out at the purifiers and the approximate c.v. calculated. When satisfactory, the zinc acetate washer by-pass was opened and the gas passed through the meters to an empty holder, until a c.v. of 450 plus was maintained. The gas was then diverted into other holders and that containing the low c.v. gas isolated.

# GAS GETS THE GREEN LIGHT

## *Commons told: No advantage in curtailing developments*

NEWS SUPPLEMENT

IMPORTANT statements on the future of the gas industry were made by the Minister of Power, Mr. Richard Wood, when he moved the second reading of the Gas Bill in the House of Commons last week. The Bill raises the borrowing limit of the industry to £525 mill. Mr. Wood said: 'As long as the gas industry economically meets the demand which it serves, I cannot see any advantage in curtailing its activities.'

Here are the main points of the Minister's speech:—

- Liquid methane: 'A decision which would prevent the British Gas Council or the British shipping industry from benefiting from a lead which they have clearly established in this field would have to be based on very certain grounds . . . . It may be some time before the Gas Council puts its proposals to me. When it does so, I undertake to examine them urgently and to report to the House as soon as I can.'
- Coal: The Gas Council is to consult with the N.C.B. at the planning stage of any major gas-making project. If existing plants are to use less the longest possible warning will be given. Better supplies have enabled the N.C.B. to offer an improved choice on more attractive terms.
- National grid: There is a possibility of making substantial economies by basing the gas supply on large manufacturing units in the coalfields and piping gas to where it is wanted. 'The present position is that the gas industry is studying the possibilities of a grid.'
- Coke: 'I have been pleased . . . to find at least one chairman of a gas board who was concerned at the prospect of obtaining his supplies of gas without coke because he had a ready market for the coke—a market which . . . would continue to grow significantly. Looking ahead I think there is likely to be an increasing demand for fuels which call for no storage and very little effort on the part of the user. We can all see piped and wired fuels developing to a larger extent in the next few years.'

### *Freedom of choice*

Summing up, the Minister said fuel policy was based on freedom of choice. This did not mean holding back any of the competitors that might have achieved a temporary lead. It meant trying to help each competitor to compete as effectively as it could.

'Therefore, my conclusion is that if the gas industry suggests developments that will clearly increase its competitive power, I find it difficult to think of grounds on which such a request should be refused,' he concluded.

## 'Great future for the industry'

MEMBERS of Parliament were flattering in their remarks during the debate on the second reading of the Gas Bill.

**Mr. F. Lee** (Lab. Newton) said the industry had done a 'jolly good job of work' under difficult conditions since nationalisation.

**Mr. John Osborn** (C. & L. Hallam) said the industry had a great future.

**Mr. Gerald Nabarro** (C. Kidderminster) said there had been hardly any grave criticism of the industry in the past ten years. It had succeeded because the managerial units had been organised to optimum size, and because there were 12 area boards almost entirely autonomous, responsible directly to the Minister.

**Mr. E. A. Fitch** (Lab. Wigan) also believed the industry had a great future.

**Mr. Harold Finch** (L. Bedwellty) said there could be no doubt that each of the 12 area boards had shown courage, efficiency, and drive.

## *ANTI-SMOKE PROGRESS QUIZ GOES OUT TO 1,700 LOCAL AUTHORITIES*

A NATION-WIDE inquiry into the working of the Clean Air Act of 1956 is being conducted by the National Society for Clean Air. A questionnaire is being sent to the 1,700 local authorities in England, Wales and Scotland who are responsible for administering the Act to ascertain how well, or otherwise, the Act is succeeding.

The Act, which followed the proposals of the Beaver Committee on Air Pollution, introduced so many new methods and principles for the prevention of smoke that it has become desirable to learn how effective it is proving to be in practice, what weaknesses or difficulties may have emerged, and whether any changes should be sought, either in the Act itself or in any of the regulations that have been made under it.

The questionnaire is in 12 main sections, each of which includes queries on points of detail, ranging from the number of cases of dark smoke emission brought to court, to the state of public opinion in proposed smoke control areas. One of the needs, stressed by the Beaver Committee and allowed for in the Act, is in the field of education and publicity, and the questionnaire asks what is being done to make sure that the need for clean air is understood.

The replies to the questionnaire, after being analysed, will be the subject of reports that are to be presented for discussion at the annual conference of the society at Harrogate in October. It is anticipated that the information obtained and the inferences that may be drawn from it will be of considerable importance to all local authorities and to the central government itself.

## COAL-GAS PLANT SHUT DOWN

THE Scottish Gas Board will close the coal carbonising plant at Dawsholm gasworks, Glasgow, at the end of April. Increased intake of coke-oven gas and, in the near future, of gas from the new Lurgi plant now under construction in Fife, has made the plant uneconomic.

Where redundancy occurs treatment will be within the terms of the industry's agreement providing for compensation.

## COLONIAL GAS

Colonial Gas Holdings Ltd. have declared interim dividends as follows: Preferred 3%, ordinary 4%, payable on April 14.

*Introducing the*

# NEW WORLD

**THE DE-LUXE COOKER**
**FOR THE SMALLER HOUSEHOLD**

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# Thirty Three

*The NEW WORLD Thirty Three introduces a hotplate of advanced design, incorporating entirely new boiling burners and full-width pan rests all made from stainless Steel.*

## STAINLESS STEEL ON THE HOTPLATE

The hotplate consists of three RADALINE boiling burners of an entirely new design each of a different size so as to give the maximum working space. The pan rests provide a smooth hotplate for the easy movement of pans and kettle. The separate rods which comprise the pan rests are easily removable, and cleaning is simplicity itself.

- EYE-LEVEL GRILL—THE FIRST TO BE FEATURED ON A SMALL COOKER
- TWIN PLATE RACKS—EACH HOLDING SIX DINNER PLATES
- AUTOMATIC HOTPLATE IGNITION
- 10 lb. TURKEY SIZED OVEN WITH DROP DOOR, REGULO CONTROLLED
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- AVAILABLE IN CREAM OR WHITE RADIATION VITREOUS STAIN-RESISTING ENAMELS

NEW WORLD

PRODUCT OF Radiation Ltd.

**leads the way**

**Overseas news page**

# France completes final link in Lacq-Paris feeder system

HAVING successfully crossed the Loire and the Marne, the pipeline bringing natural gas from Lacq to Paris has now crossed the two arms of the Seine, the last obstacle on its route. The double operation is the final link in the completion of the national gas feeder system from the fields in France's south-west.

Effected at the height of the Ile St.-Denis, the crossing of the large arm of the Seine was especially spectacular by reason of the relative importance of the submerged pipes which are 425 ft. long. Utilising four 40-ton floating derricks, the pipe-line—consisting of two 16-in. and three 12-in. pipes and resting on barges hitched together—was lowered into a river trench at a depth of 25 ft. At the moment of submerging the siphon, the total weight of the assembly of ballasted pipes was in excess of 130 metric tons.

Techniques for the installation of pipe-lines at river crossings have been perfected in France to such a point that such operations rarely need more than two hours for completion. With a total length of 1,250 miles, the French pipeline and distribution system for natural gas is considered the largest in Western Europe.

Natural gas production in the French franc zone last year totalled 2,664 mill. cu.m., as against 1,084 mill. cu.m. in 1958.

## Largest sulphuric acid plant

THE largest single sulphuric acid producing unit in the world is now on stream. It is owned by Dixon Chemical Industries and located at Paulsboro, New Jersey, U.S.A. This plant, costing over $5 mill., was designed and built by Chemical Construction Corporation, using the Chemico process.

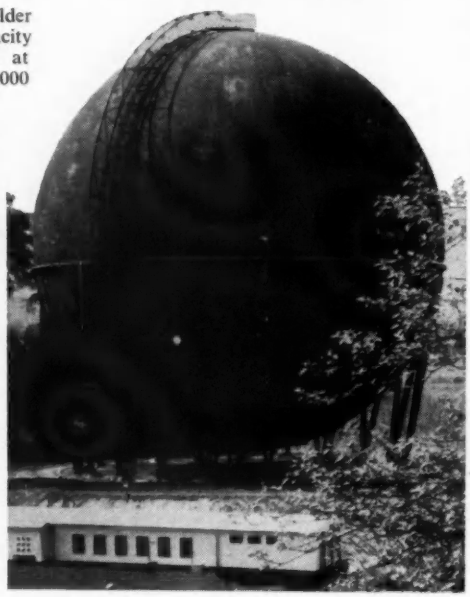
## RUHR CITY HAS NEW GASHOLDER

A SPHERICAL gasholder of 250,000 cu.m. capacity has just been completed at Wuppertal, a city of 420,000 people, in the Ruhr.

Built beside two similar holders—of 60,000 and 40,000 cu.m. capacity respectively—this new structure is intended to store gas from the long-distance transmission pipe-line.

The holder has a maximum gas presure of 4.5 atmospheres, a diameter of 47.3 m., and a total weight of 2,000 metric tons. Weight of the sphere alone is 1,800 metric tons; its wall thickness is 30 mm. The 21 tangential double supports rest on a circular foundation wall.

Any point of the sphere can be reached by one of two ladders, the larger of which is traversed electrically.



*The new spherical gasholder*

Before and during the filling of the sphere the usual safety precautions were taken. All of the 3,600 m. length of weld-seam was X-rayed. By first injecting 21,000 cu.m. of nitrogen it was possible to form a nitrogen cushion between the air and the gas which prevented formation of an explosive mixture.

*Flashes*

## AUSSIE EXPERT PREDICTS BIG OIL-GAS STRIKES

LEADING Australian geologist R. C. Sprigg stated on March 3 that he believed oil would be found in Australia soon. Speaking in Adelaide, he expressed his conviction that there was a major oilfield near Port Campbell, in Victoria.

A strike of petroleum gas near that locality in January was hailed as one of the most significant oil-gas discoveries in the country. Sprigg discounted stories that there was no oil in Australia. He said U.S.A. petroleum experts claimed Australia was an oil country, and time would prove this correct. He pointed out that in the U.S.A. 5,000 or 6,000 oil bores were being sunk annually, while in Australia there were only five or six.

* * *

Simon-Carves Ltd. have received an order for the design and supply of equipment for a polythene plant for Petroleos Mexicanos, the national oil company of Mexico. The plant is to be installed on a site near Mexico City. It will operate the I.C.I. process, an appropriate agreement having been concluded between Imperial Chemical Industries and Petroleos Mexicanos.

* * *

Following discussions with the Electricity Corporation of Nigeria, a new power station will soon be built at Shell-BP's producing field at Afam, where natural gas reserves are estimated to be capable of providing it with power for 20 or more years. At present 1½ mill. cu.ft. is burnt off daily.

* * *

Engineers of the Argentine petroleum authority—Yacimientos Petroliferos Fiscales—are reporting on the possibility of supplying natural gas to the north of Chile. They are calculating the size of the available gas deposits to determine if they are sufficient to supply power, fuel and heating for all the northern Chilean cities.

* * *

The remaining coal-gas plant in Buenos Aires (Parque Patricios district) was formally closed down on February 10. Buenos Aires has now been fully converted to supplies of natural gas.

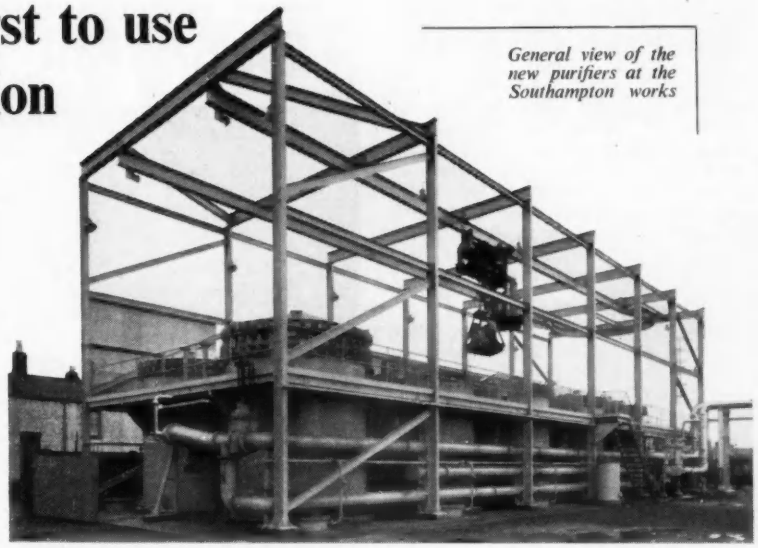
* * *

The French metallurgical industry is undertaking large-scale trials of the utilisation of natural gas in steel production in the Lower Pyrenees for a period of about two years.

## Moscow exhibition

Demonstrations by 34 British scientific instrument makers will be given at an exhibition in Moscow in June, organised by the Scientific Instrument Manufacturers' Association of Great Britain.

# Purifier set is first to use rapid rotation



*General view of the new purifiers at the Southampton works*

THE first set of purifiers to be specifically designed to take advantage of the principle of rapid rotation (British Patent Application Nos. 10434/58, 26587/58, 36896/58) has been commissioned at the Southampton works of the Southern Gas Board.

These purifiers, which were installed for the purpose of removing hydrogen sulphide from refinery gases at the inlet of the reforming plant, were designed and constructed by the chemical engineering division of W. C. Holmes & Co. Ltd., to the order of Humphreys & Glasgow Ltd.

**Rapid completion**

Instructions to begin making the purifiers were only received in April, 1959, and although the plant was novel in almost every way and needed completely new drawings, it was commissioned in a little under eight months.

Nominal capacity of the purifiers is 2.6 mill. cu.ft. of gas a day containing up to 1,200 grains of hydrogen sulphide per 100 cu.ft. The gas flow is cyclic at an operating pressure of 9 lb. per square inch.

To meet the pressure conditions, and also to help speed up manufacture and erection, the purifiers were made in ten identical circular units; welding was carried out on site, the covers being manufactured in Huddersfield and transported by road in two special loads.

The purifiers are fitted with Holmes Western 55 gas valves, which are automatically operated by Lockheed hydraulic cylinders. The hydraulic system was designed and carried out by Humphreys & Glasgow, Ltd., the power being supplied by the existing hydraulic installation on the reforming plant.

**Sequence timer**

Automatic operation of the valves is carried out by a special timer which is set to change the sequence of the purifiers every two hours. This can be adjusted and, if necessary, the timing mechanism can be operated by hand.

The time taken to swing the purifiers is approximately one minute, although this can be varied by adjusting the speed of opening and closing of each valve individually by a simple adjustment on the hydraulic mechanism of each valve.

As the time allowed for completion of the contract was so very limited, it was found necessary to confine all items for the installation to those which could be designed, manufactured and erected in the short space of eight months. This eliminated the use of overhead cranes and emptying of the purifiers is carried out from a telpher fitted with a modern grab. This telpher runs on a mono-rail which passes over the set of purifiers and discharges at the end, either onto the ground or into a lorry.

## *WOMEN ATTACK GAS CHARGES*

LEADERS of the Scottish Housewives' Association have sent letters to all 72 Scottish Members of Parliament asking them to demand a revision of the Board's 'extortionate' charges.

The letter says there is widespread indignation over recent 'high-handed methods of the Board in raising their charges, not only on the price of gas but also in instituting a 'so-called standing charge.' The Board, it adds, tried to base justification of this charge on the claim that 'all services must be paid for,' but users had no more amenities now than before nationalisation, when there was no standing charge.

At a conference in Dundee the housewives heard their President, Mrs. H. F. Rattray, Kirriemuir, refer to 'get rich quick' methods. 'The Board is trying to make good the losses which are no doubt caused through the usual squandermania of nationalisation by inflicting what they term a standing charge.'

## *PRICE DROP*

Radiation Group Sales Ltd. has reduced the price of the New World 200 gas refrigerator from £40 16s. 8d. to £38 19s. 9d., as a result of re-organisation and re-equipping its production centre.

## North to see gas at work in industry

A NORTHERN Gas at Work in Industry exhibition, lasting five days, opens at Harrogate on March 28. It is being organised by the North Eastern and the Northern Gas Boards.

The Harrogate exhibition will differ from the London show which closed on March 12 in a number of respects. In addition to a demonstration of the many industrial applications of gas there will also be a comprehensive catering section, a special section presenting heat services suitable for commercial and civic buildings and local authorities' houses and flats, and an important section devoted to research and development projects which are being carried out by the two Gas Boards promoting the exhibition.

It is to be opened at 3 p.m. on Monday, March 28, by Sir William Scott, O.B.E., Managing Director of Armstrong Whitworth (Metal Industries), Ltd., and Jarrow Metal Industries, Ltd.

Five thousand invitations are being distributed by the two Gas Boards to industrial and commercial firms, heating engineers, architects, local authority officials, and other people likely to be interested.

## GAS CENTRAL HEATING RUSH IN NORTH WEST

MORE than 500 gas central heating units for private and municipal houses were ordered in the area served by the North Western Gas Board in the three months ended December last.

The majority were gas-fanned warm air installations in which the air is warmed by a central gas heater and ducted into several rooms through wall grilles.

Of the total 526 gas central heating orders 485 were for fanned warm air systems and 41 were for gas small-bore central heating.

About one-quarter of both types of gas central heating system have been installed or are on order for existing houses; the rest are for new houses where the system is incorporated while the house is being built.

## PERSONAL NOTES

MR. W. J. WYERS has been appointed Products Assistant Chief Designer to the research and development department of Rubery Owen & Co. Ltd., Darlaston, the parent company of the Owen organisation. He will be responsible for designing, prototype building, testing and producing a number of the group's products. Mr. Wyers was previously assistant chief designer with Cannon Industries for 18 years.

LADY JONES, wife of Sir Henry Jones, Chairman of the Gas Council, has been unanimously elected President of Headquarters Branch, Women's Gas Federation. MRS. I. B. TURNER (Chairman) and MRS. A. D. L. COPP (Vice-Chairman), have been re-elected.

MR. G. B. RICHARDSON, a gas welder who has had 37 years' service with Ashmore, Benson, Pease & Co. Ltd., Stockton-on-Tees, has received the British Empire Medal for his welfare activities.

## OBITUARY

MR. THEODORE NICHOLSON, who was the first manager of the coke-oven and by-product plant at Brancepeth Colliery, Co. Durham, and retired in 1932, has died at Hertfordshire, aged 84.

DR. Z. K. A. MOSZYNSKI, Principal Scientific Officer of the British Coke Research Association, has died aged 52.

MR. ALEXANDER CRAIG, former manager of the Kilwinning Gas Company, has died.

## EDINBURGH FITTERS STRIKE, THEN WORK TO RULE

AFTER staging a one-day unofficial strike as a protest against the use of a stop-watch in a time and method study, nearly 200 fitters and maintenance men of the Scottish Gas Board in the Edinburgh area decided to work to rule.

Mr. H. Hutchison, speaking on behalf of the men, said: 'We fully agree that the Board, in the face of intense competition, require to employ up-to-date methods. We fail to see, however, anything up to date in the use of the stop-watch. . . . We would ask the people of Edinburgh if they have noticed any notable changes in gas in the past six years.'

An official of the Scottish Gas Board said the study had been introduced to bring about greater efficiency and to lower costs.

Mr. D. Beavis, General Manager of the Division, commented: 'We have a rule book, which includes the Board's standard practices, and if the men work to these rules it is no more than they are expected to do at any time.'

## Board show catering wares

*The South Western Gas Board's latest activities in the catering exhibition field have met with considerable success. The Board has staged its own events at Minehead and Weston-super-Mare and has taken part in the Newquay catering exhibition, while Torquay is also on the programme. Our photograph shows the Gas Board stand at the Newquay event.*

## FORTHCOMING EVENTS

**March 17.**—EASTERN JUNIORS: Bedford. Visit to Brittania iron works. Paper on the industrial uses of gas by J. Finedon.

**March 21.**—WEST MIDLANDS G.C.C.: Edmund Street, Birmingham 3. Council Meeting at 2.30 p.m.

**March 22.**—LONDON AND SOUTHERN JUNIORS: Visit to the works of Bryan Donkin Co. Ltd., at Chesterfield.

**March 23.**—WESTERN JUNIORS: King's Head Hotel, High Street, Newport. Address by R. S. Hayman, Industrial Gas Officer, Gas Council. 11.30. (Joint meeting with Wales and Monmouthshire Juniors).

**March 23.**—SCOTTISH WESTERN JUNIORS: Visit to McFarlane Lang's Victoria biscuit works. Members' Ladies invited. 2.30 p.m.

**March 24.**—MIDLAND JUNIORS: Half-dav visit to the works of Guest, Keen & Nettlefold Ltd., Darlaston.

**March 25.**—NORTHERN JUNIORS: Joint meeting with North of England Section, I.G.E. Paper on underground storage, by E. Crowther.

**March 26.**—MIDLAND JUNIORS: Victoria Hotel, Wolverhampton. Annual dinner 6.30 p.m.

**March 26.** — MANCHESTER JUNIORS: Visit to the new Hoscar sewage works near Parbold, followed by a meeting at the gas showrooms, Wigan. Paper on gasworks effluent treatment by C. R. Hollingshead, Chief Chemist of the South Lancashire Group

**March 29.**—THE SOCIETY OF INSTRUMENT TECHNOLOGY: Manson House, 26, Portland Place, London, W.1. 'Application of Transistors in Instrumentation,' by G. G. Bloodworth. 7 p.m.

**March 29.** — LONDON AND COUNTIES COKE SALES CIRCLE: Connaught Rooms, Great Queen Street, Kingsway, W.C.2. Coke Salesmen's Conference.

## *Discuss integration*

Simon-Carves Ltd. and Henry Simon (Holdings) Ltd. announce that discussions are taking place regarding possible means of closer integration of the two companies and their subsidiaries, which are together known as the Simon Engineering group. A further announcement will be made 'in due course.'

## *MASTER SWITCH*

All gas points in the laboratory of a new science-block costing £15,000 at Market Drayton co-educational grammar school, Shropshire, can be controlled by the master from his desk. The domestic science room includes gas cookers.